

THE LANCET

Supplementary appendix

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Seroprevalence of SARS-COV2 Antibodies in a Large Nationwide Sample of Patients on Dialysis in U.S.
Web Appendix

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Appendix Table 1: Population and subpopulation sizes by region and number of patients required

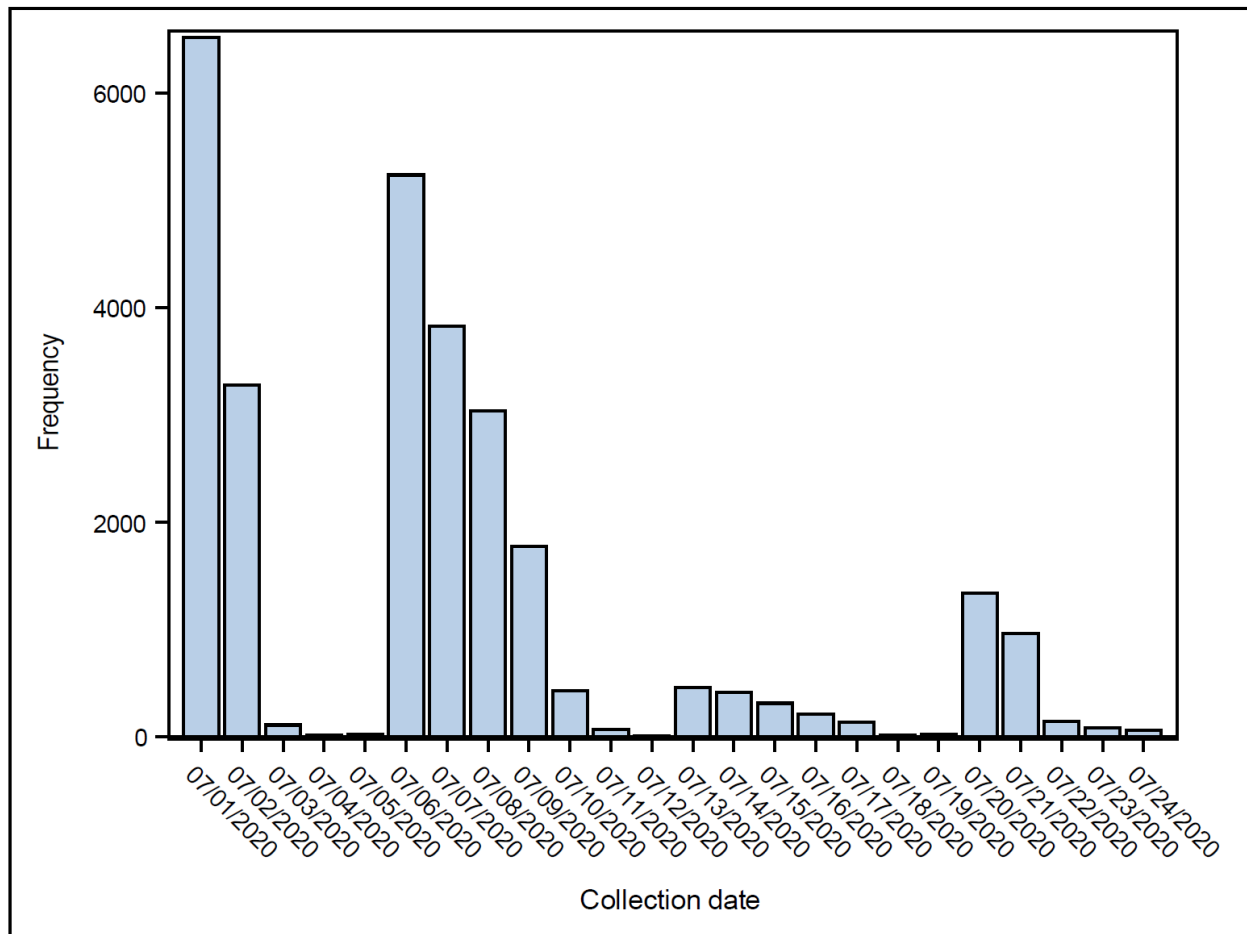
Region	Dialysis Population count*	Subpopulation[§] size	Sample size required[^]
West	111,067	20,361	6,849
South	214,974	23,833	7,060
Northeast	78,619	10,160	6,679
Midwest	94,490	8,739	6,776
Total	499,150	63,093 [#]	27,364

*obtained from USRDS ADR 2018 report [§]Subpopulation refers to Commercial laboratory patient population [^]Sample size required for 0.5% absolute precision assuming that the prevalence of Covid-19 in this population is 5% [#]Number higher than those used in main Figure 1 as some participants in subpopulation were < 18 years old at time of sample size calculation.

Sample Processing Protocol for Seroprevalence Assay

Blood specimens were collected in Lithium Heparin gel plasma tubes and centrifuged within 2 hours at 3000-3400 RPM for 15-20 minutes. These specimens are stored and transported @ 2-8 °C until analysis. If specimens are not tested within 2 days then they are frozen at -20 °C until analysis is performed. If specimens were frozen, they were thoroughly mixed after thawing and centrifuged before testing. This SARS-COV-2 total antibody assay was performed on automated Siemens Atellica IM-1600 immunoassay analyzers designed for high accuracy and precision performance of tests on clinical laboratory specimens utilizing a chemiluminescence test method. The specimen tubes were decapped, placed directly on the analyzer, and test time is approximately 10 minutes.

Appendix Figure 1: Timing of patient laboratory draw for seroprevalence testing in July 2020

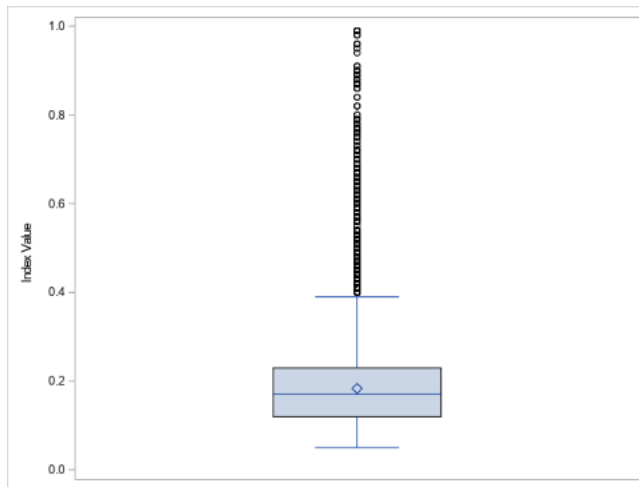


A majority (88.5%) of samples were collected in the first two weeks of July.

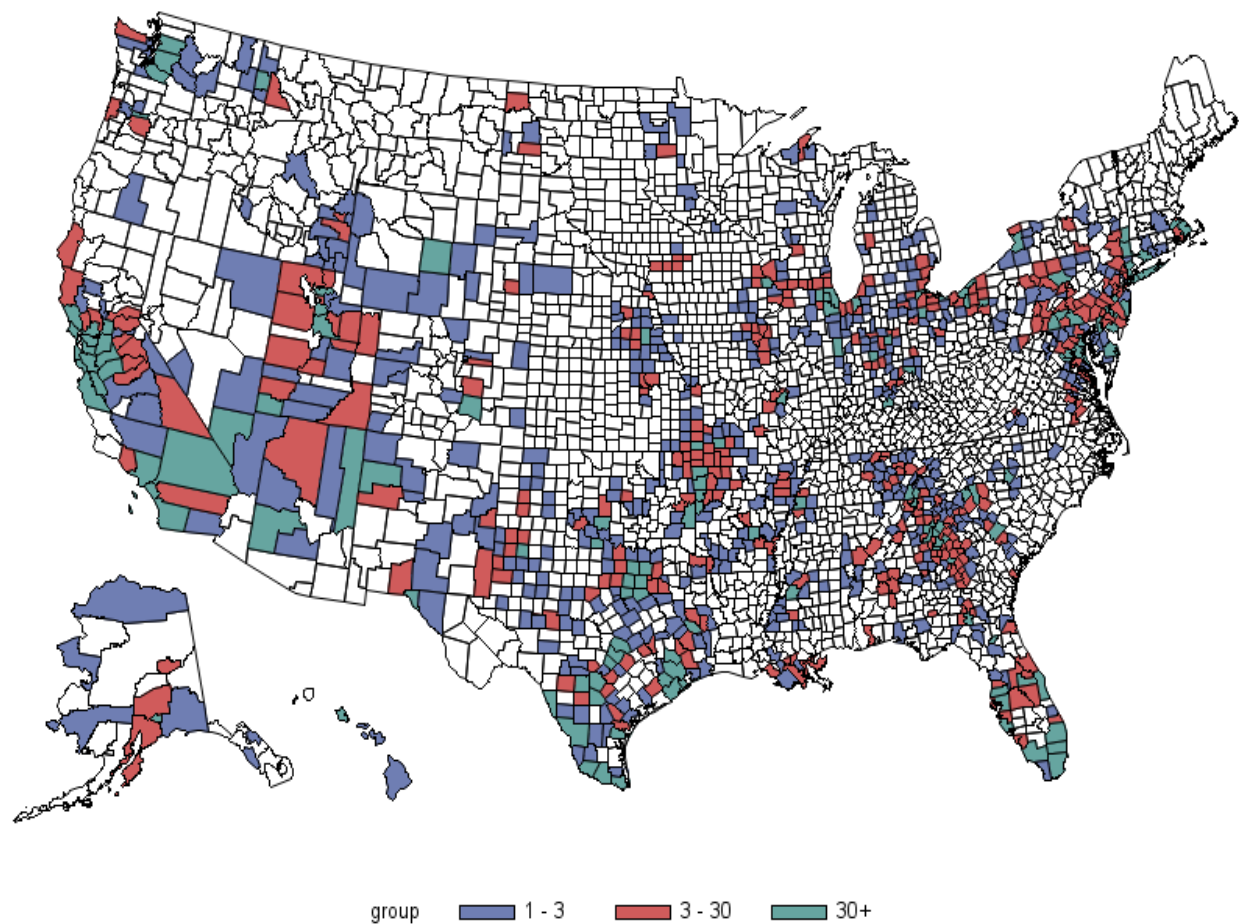
Appendix Figure 2: Distribution of the assay results under the threshold of 1 (non-reactive individuals)

99% of the individuals with a non-reactive result had an assay value below 0.49.

Quantiles (Definition 5)	
Level	Quantile
100% Max	0.99
99%	0.49
95%	0.34
90%	0.29
75% Q3	0.23
50% Median	0.17
25% Q1	0.12
10%	0.07
5%	0.05
1%	0.05
0% Min	0.05



Appendix Figure 3: Patients sampled for SARS-COV-2 antibody testing by county



Appendix Table 2: Test characteristic adjusted estimates in the sampled population

	Adjusting for lower test sensitivity assuming a specificity of 99.8%				
	Unweighted sample		Sensitivity 85%	Sensitivity 93%	Sensitivity 98%
	Count	Seropositive %			
Age*					
18-44	291	8.8 (7.9, 9.9)	10.4 (9.3, 11.6)	9.5 (8.5, 10.6)	9.0 (8.1, 10.1)
45-64	958	8.3 (7.8, 8.8)	9.8 (9.2, 10.4)	8.9 (8.4, 9.5)	8.5 (8.0, 9.0)
65-79	807	7.9 (7.4, 8.5)	9.3 (8.7, 10.0)	8.5 (8.0, 9.1)	8.1 (7.6, 8.7)
≥80	236	6.9 (6.0, 7.8)	8.1 (7.1, 9.2)	7.4 (6.5, 8.4)	7.0 (6.1, 8.0)
Sex					
M	1322	8.1 (7.7, 8.5)	9.5 (9.1, 10.0)	8.7 (8.3, 9.1)	8.3 (7.9, 8.7)
F	970	8.0 (7.5, 8.5)	9.4 (8.8, 10.0)	8.6 (8.1, 9.1)	8.2 (7.7, 8.7)
Race and Ethnicity**					
Hispanic	201	6.3 (5.5, 7.2)	7.4 (6.5, 8.5)	6.8 (5.9, 7.7)	6.4 (5.6, 7.3)
Non-Hispanic Black	467	9.5 (8.7, 10.4)	11.2 (10.2, 12.2)	10.2 (9.4, 11.2)	9.7 (8.9, 10.6)
Non-Hispanic White	229	3.5 (3.1, 4.0)	4.1 (3.6, 4.7)	3.8 (3.3, 4.3)	3.6 (3.2, 4.1)
Other	103	4.2 (3.4, 5.0)	4.9 (4.0, 5.9)	4.5 (3.7, 5.4)	4.3 (3.5, 5.1)
Unknown	1292	11.3 (10.7, 12.0)	13.3 (12.6, 14.1)	12.2 (11.5, 12.9)	11.5 (10.9, 12.2)
ZCTA Majority Race and Ethnicity***					
Hispanic	412	9.0 (8.2, 9.9)	10.6 (9.6, 11.8)	9.7 (8.8, 10.8)	9.2 (8.4, 10.2)
Non-Hispanic Black	380	14.7 (13.3, 16.3)	17.3 (15.6, 19.2)	15.8 (14.3, 17.5)	15.0 (13.6, 16.6)
Hispanic & Black	420	14.6 (13.3, 16.1)	17.2 (15.6, 18.9)	15.7 (14.3, 17.3)	14.9 (13.6, 16.4)
Non-Hispanic White	367	4.2 (3.8, 4.7)	4.9 (4.5, 5.5)	4.5 (4.1, 5.1)	4.3 (3.9, 4.8)
Integrated	713	7.3 (6.8, 7.9)	8.6 (8.0, 9.3)	7.8 (7.3, 8.5)	7.4 (6.9, 8.1)
Region**					
Northeast	1231	27.1 (25.7, 28.7)	31.9 (30.2, 33.8)	29.1 (27.6, 30.9)	27.7 (26.2, 29.3)
South	474	4.3 (4.0, 4.7)	5.1 (4.7, 5.5)	4.6 (4.3, 5.1)	4.4 (4.1, 4.8)
Midwest	265	7.0 (6.2, 7.9)	8.2 (7.3, 9.3)	7.5 (6.7, 8.5)	7.1 (6.3, 8.1)
West	322	3.5 (3.1, 3.9)	4.1 (3.6, 4.6)	3.8 (3.3, 4.2)	3.6 (3.2, 4.0)
Overall	2292	8.0 (7.7, 8.4)	9.4 (9.1, 9.8)	8.6 (8.3, 8.9)	8.2 (7.9, 8.5)

Appendix Table 3: Sample statistics at the state level for the selected sample, the U.S. adult dialysis population and U.S. adult population
Sampled data and seropositive % also shown in Figure 2.

Region	State	Sampled patients N (%#)	Seropositive % (95% CI)	U.S. adult dialysis population N (%#)	U.S. adult population N (%&)
Northeast					
	Connecticut (CT)	117 (0.4%)	8.5% (4.6%, 15.9%)	4331 (0.9%)	2,837,599 (1.1%)
	Maine (MN)	0	N/A	1152 (0.2%)	1,089,852 (0.4%)
	Massachusetts (MA)	150 (0.5%)	11.3% (7.0%, 18.2%)	6876 (1.4%)	5,535,023 (2.2%)
	New Hampshire (NH)	0	N/A	906 (0.2%)	1,098,330 (0.4%)
	New Jersey (NJ)	286 (1.0%)	11.9% (8.5%, 16.6%)	14346 (2.9%)	6,957,515 (2.7%)
	New York (NY)	3363 (11.8%)	33.6% (31.7%, 35.6%)	30832 (6.2%)	15,477,524 (6.1%)
	Pennsylvania (PA)	622 (2.2%)	6.4% (4.7%, 8.8%)	18661 (3.7%)	10,159,443 (4.0%)
	Rhode Island (RI)	0	N/A	1110 (0.2%)	853,407 (0.3%)
	Vermont (VT)	0	N/A	405 (0.1%)	510,772 (0.2%)
South					
	Alabama (AL)	118 (0.4%)	4.2% (1.8%, 10.2%)	9766 (2.0%)	3,798,766 (1.5%)
	Arkansas (AR)	535 (1.9%)	1.9% (1.0%, 3.5%)	4681 (0.9%)	2,309,865 (0.9%)
	Delaware (DE)	87 (0.3%)	5.7% (2.4%, 13.8%)	1732 (0.4%)	764,021 (0.3%)
	District of Columbia (DC)	47 (0.2%)	21.3% (11.4%, 39.5%)	2157 (0.4%)	575,241 (0.2%)
	Florida (FL)	1520 (5.3%)	4.6% (3.6%, 5.8%)	31476 (6.3%)	17,071,450 (6.7%)
	Georgia (GA)	1187 (4.2%)	4.5% (3.5%, 5.9%)	21172 (4.2%)	8,016,182 (3.2%)
	Kentucky (KY)	63 (0.2%)	4.8% (1.5%, 14.8%)	6184 (1.2%)	3,460,621 (1.4%)
	Louisiana (LA)	91 (0.3%)	17.6% (10.8%, 28.7%)	10173 (2.0%)	3,562,393 (1.4%)
	Maryland (MD)	456 (1.6%)	12.9% (10.0%, 16.7%)	10947 (2.2%)	4,704,363 (1.9%)
	Mississippi (MS)	111 (0.4%)	4.5% (1.9%, 10.8%)	7635 (1.5%)	2,280,808 (0.9%)
	North Carolina (NC)	104 (0.4%)	1.9% (0.5%, 7.7%)	17697 (3.6%)	8,086,762 (3.2%)
	Oklahoma (OK)	189 (0.7%)	0.5% (0.1%, 3.8%)	5452 (1.1%)	2,986,759 (1.2%)
	South Carolina (SC)	362 (1.3%)	2.2% (1.1%, 4.4%)	10171 (2.0%)	3,979,718 (1.6%)
	Tennessee (TN)	655 (2.3%)	2.1% (1.3%, 3.6%)	10937 (2.2%)	5,260,635 (2.1%)
	Texas (TX)	5090 (17.9%)	3.6% (3.1%, 4.2%)	49211 (9.9%)	21,302,361 (8.4%)
	Virginia (VA)	318 (1.1%)	9.1% (6.3%, 13.1%)	13058 (2.6%)	6,648,045 (2.6%)
	West Virginia (WV)	4 (0.0%)	0%	2525 (0.5%)	1,442,607 (0.6%)

Midwest				
Illinois (IL)	1075 (3.8%)	17.5% (15.2%, 20.2%)	21556 (4.3%)	9,885,278 (3.9%)
Indiana (IN)	382 (1.3%)	3.1% (1.8%, 5.5%)	9447 (1.9%)	5,124,821 (2.0%)
Iowa (IA)	195 (0.7%)	2.6% (1.1%, 6.2%)	2752 (0.6%)	2,422,756 (1.0%)
Kansas (KS)	55 (0.2%)	0%	3280 (0.7%)	2,206,359 (0.9%)
Michigan (MI)	83 (0.3%)	7.2% (3.2%, 16.1%)	15235 (3.1%)	7,831,650 (3.1%)
Minnesota (MN)	16 (0.1%)	6.3% (0.9%, 44.4%)	4863 (1.0%)	4,309,132 (1.7%)
Missouri (MO)	426 (1.5%)	1.9% (0.9%, 3.8%)	8878 (1.8%)	4,748,726 (1.9%)
Nebraska (NE)	163 (0.6%)	2.5% (0.9%, 6.5%)	1817 (0.4%)	1,454,382 (0.6%)
North Dakota (ND)	13 (0.0%)	0%	716 (0.1%)	585,363 (0.2%)
Ohio (OH)	1314 (4.6%)	3% (2.2%, 4.1%)	18430 (3.7%)	9,099,006 (3.6%)
South Dakota (SD)	1 (0.0%)	0%	945 (0.2%)	667,772 (0.3%)
Wisconsin (WI)	40 (0.1%)	5% (1.3%, 20.0%)	6571 (1.3%)	4,541,463 (1.8%)
West				
Alaska (AK)	150 (0.5%)	0.7% (0.1%, 4.7%)	570 (0.1%)	553,978 (0.2%)
Arizona (AZ)	191 (0.7%)	4.7% (2.5%, 9.1%)	9733 (2.0%)	5,529,647 (2.2%)
California (CA)	6186 (21.7%)	3.8% (3.3%, 4.3%)	68238 (13.7%)	30,571,507 (12.0%)
Colorado (CO)	53 (0.2%)	1.9% (0.3%, 13.4%)	4602 (0.9%)	4,428,826 (1.7%)
Hawaii (HI)	800 (2.8%)	0.1% (0.0%, 0.9%)	3796 (0.8%)	1,117,236 (0.4%)
Idaho (ID)	83 (0.3%)	0%	1459 (0.3%)	1,308,838 (0.5%)
Montana (MT)	0	N/A	833 (0.2%)	832,340 (0.3%)
Nevada (NV)	49 (0.2%)	0%	4496 (0.9%)	2,345,172 (0.9%)
New Mexico (NM)	244 (0.9%)	5.7% (3.4%, 9.7%)	3431 (0.7%)	1,615,191 (0.6%)
Oregon (OR)	84 (0.3%)	4.8% (1.8%, 12.7%)	4297 (0.9%)	3,318,125 (1.3%)
Utah (UT)	491 (1.7%)	3.1% (1.8%, 5.1%)	1956 (0.4%)	2,229,274 (0.9%)
Washington (WA)	886 (3.1%)	5.1% (3.8%, 6.8%)	7262 (1.5%)	5,873,652 (2.3%)
Wyoming (WY)	46 (0.2%)	0%	394 (0.1%)	444,641 (0.2%)

% calculated over the selected sample (N=28,501, n=2 missing zipcode)

\$ % calculated over the total U.S. adult dialysis population (N=499,150)

& % calculated over the total U.S. adult population (N=253,815,197)

N/A, not available;

Appendix Figure 3: Prevalence of SARS-CoV-2 antibodies, cumulative cases per 100,000 and deaths per 100,000 on a county level in California (a), Texas (b) and New York (c).

Shading from lighter to darker represents quintiles of each disease measure.

